

CampbellReith		Page 4
Raven House 29 Linkfield Lane Surrey RH1 1SS		
Date 08/02/2018 12:42	Designed by SamT	
File BROWNFIELD RUN-OFF RATE...	Checked by	
XP Solutions	Network 2017.1.1	

Network Classifications for Storm

PN	USMH Name	Pipe Dia (mm)	Min Cover Depth (m)	Max Cover Depth (m)	Pipe Type	MH Dia (mm)	MH Width (mm)	MH Ring Depth (m)	MH Type
S1.000	S1	225	1.267	1.375	Unclassified				Junction
S1.001	S2	225	1.375	1.383	Unclassified	1200	0	1.375	Unclassified

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.001	S	6.020	4.412	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff 0.750 Additional Flow - % of Total Flow 0.000
 Areal Reduction Factor 1.000 MADD Factor * 10m³/ha Storage 2.000
 Hot Start (mins) 0 Inlet Coefficient 0.800
 Hot Start Level (mm) 0 Flow per Person per Day (l/per/day) 0.000
 Manhole Headloss Coeff (Global) 0.500 Run Time (mins) 60
 Foul Sewage per hectare (l/s) 0.000 Output Interval (mins) 1

Number of Input Hydrographs 0 Number of Storage Structures 0
 Number of Online Controls 0 Number of Time/Area Diagrams 0
 Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.350		

Manhole Headloss for Storm

PN	US/MH Name	US/MH Headloss
S1.000	S1	0.000
S1.001	S2	0.500

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CASDeF Controller for Storm

PN	US/MH Name	Level Exceeded	Not Modify	Modify Control	Modify Pipe Size	Max Pipe Diameter	No. Pipe Failures	Add Storage	No. Storage Failures	Use CASDeF
S1.000	S1	6.210	Yes	No	1342	0	Yes	0	Yes	
S1.001	S2	6.020	Yes	No	1450	0	Yes	0	Yes	

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Appendix E: Communications with Arun District Council

----- Message from Paul Cann <Paul.Cann@arun.gov.uk> on Tue, 19 Dec 2017 14:51:35 +0000 -----

Subject: RE: 12634 - Student residences - Bognor Regis

Marcel

Regarding the surface water drainage, I would confirm that it appears that the impermeable areas will not be changing as a result of the development. It is difficult to provide betterment due to the footprint of the building itself and proximity of other buildings.

However, green roofs can always be a consideration?

The most important thing is to ensure that no surface water (ie. existing/proposed) is discharged into the foul drainage system.

Regards

Paul Cann
Senior Engineer (Drainage & Coastal)

Paul.Cann | Senior Engineer (Drainage & Coastal), Engineering Services, Arun District Council | Location: First Floor, Arun Civic Centre, Maltravers Road, Littlehampton, BN17 5LF
Internal: 37819 | External: +44 (0) 1903 737819 | Fax: +44 (0) 1903 716019 | E-mail: Paul.Cann@arun.gov.uk
Arun is Working in Partnership with Chichester District Council
Visit Arun's web site at <http://www.arun.gov.uk/> and www.chichester.gov.uk
Save the environment - think before you print.

From: [REDACTED]
Sent: 11 December 2017 16:49
To: Paul Cann
Cc: [REDACTED]
Subject: RE: 12634 - Student residences - Bognor Regis

Dear Paul

I have got your contact from Kevin Macknay at West Sussex County Council.

We are working on the above project at Bedford Street Bognor Regis PO21 1PY.

This is a development for student residence (95-100 student study bedrooms arranged in clusters of between 3 to 6 bedroom self contained flats).

The existing site is a Wilko store and it is retained and the idea is not intended to replace the store but to build above it and ensure high quality design in Bognor town centre.

I understand that West Sussex is acting as the Lead Local Flood Authority for this area, and I would like to engage with the LLFA regarding the drainage requirement.

As we are not changing the existing site impermeable area (we are only building above it), could you please confirm that the stormwater discharge rate will be like for like as per the existing condition.

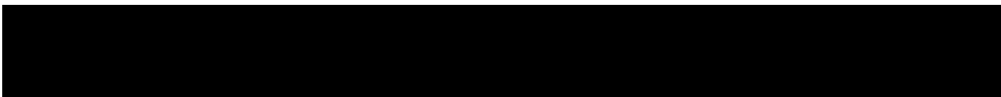
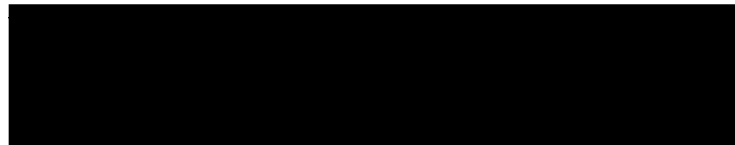
I have attached a site location plan with the site boundary in red and topo survey for your information.

Please let us know .

We would also be grateful if you could provide us with a point of contact for the LLFA.

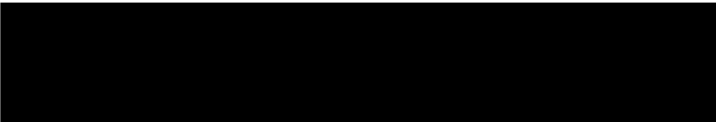
Kind Regards

Marcel Mendy
Senior Engineer
For and on Behalf Of
CampbellReith



Date: 11/12/2017 16:01

Subject: RE: 12634 - Student residences - Bognor Regis



Marcel,

Within West Sussex our local borough and district council still have drainage engineers who will be able to give you advise on this matter. Therefore, your enquiry should be directed to Paul Cann at Arun District Council (Paul.Cann@arun.gov.uk).

Regards,

Kevin Macknay

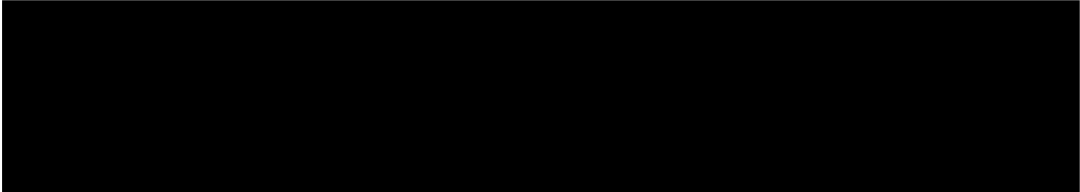
Flood Risk Management - Team Leader
Economy, Infrastructure and Environment
Highways and Transport
West Sussex County Council

 CALL  IM  EMAIL

Location: Western Area Office, Drayton Lane, Nr. Chichester, West Sussex, PO20 2AJ.

Contact: Internal: 25429 | External: +44 (0)330 222 6429 | Mobile: +44 (0)7540 641819

E-mail: kevin.macknay@westsussex.gov.uk



Sent: 05 December 2017 12:17
To: Flood Risk Management
Subject: 12634 - Student residences - Bognor Regis

Dear Sir

We are working on the above project at Bedford Street Bognor Regis PO21 1PY.

This is a development for student residence (95-100 student study bedrooms arranged in clusters of between 3 to 6 bedroom self contained flats).

The existing site is a Wilko store and it is retained and the idea is not intended to replace the store but to build above it and ensure high quality design in Bognor town centre.

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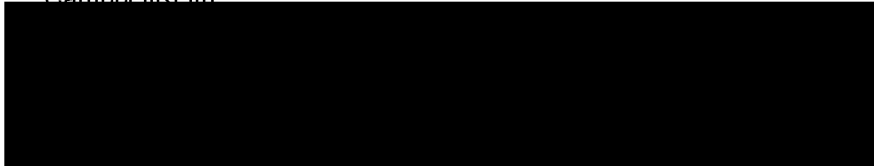
I have attached a site location plan with the site boundary in red and topo survey for your information.

Please let us know .

We would also be grateful if you could provide us with a point of contact for the LLFA.

Kind Regards

Marcel Mendy
Senior Engineer
For and on Behalf Of
CampbellReith



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Appendix F: WSCC LLFA SuDS Policies

5 Policies for Sustainable Drainage

5.1 Introduction

5.1.1 West Sussex LLFA has adopted the policies summarised in Table 5.1 to statutory policy and best practice. Policies 1 to 6 set out the requirements for a drainage strategy to be compliant with the NPPF and Non-Statutory Technical Standards for Sustainable Drainage. Policies 7 to 10 set out expectations to be considered within a drainage strategy in response to environmental legislation and guidance that West Sussex County Council and the Local Planning Authorities have a duty to comply with.

5.1.2 All the policies reflect the requirements of the Local Flood Risk Management Strategy, Surface Water Management Plans and Local Planning Authority Local Plans. Sufficient information must be submitted to demonstrate compliance.

Table 5.1: West Sussex LLFA SuDS Policies

Policy	Summary
SuDS Policy 1	Follow the drainage hierarchy
SuDS Policy 2	Manage Flood Risk Through Design
SuDS Policy 3	Mimic Natural Flows and Drainage Flow Paths
SuDS Policy 4	Seek to Reduce Existing Flood Risk
SuDS Policy 5	Maximise Resilience
SuDS Policy 6	Design to be Maintainable
SuDS Policy 7	Safeguard Water Quality
SuDS Policy 8	Design for Amenity and Multi-Functionality
SuDS Policy 9	Enhance Biodiversity
SuDS Policy 10	Link to Wider Landscape Objectives

SuDS Policy 1: Follow the drainage hierarchy

- 1. Surface runoff not collected for use must be discharged according to the following discharge hierarchy:**
 - **to ground,**
 - **to a surface water body,**
 - **to a surface water sewer, highway drain, or another drainage system, or**
 - **to a combined sewer where there are absolutely no other options, and only where agreed in advance with the relevant sewage undertaker.**
- 2. The selection of a discharge point should be clearly demonstrated and evidenced.**

5.2 SuDS Policy 1: Discharge Hierarchy

5.2.1 When development occurs, the urbanisation process within a catchment affects the natural hydrology; if the destination of the water is altered this may result in:

- a reduced supply of rainfall to groundwater,
- an accelerated passage of flow to the receiving watercourses, and
- water directed away from existing receiving catchments.

In order to maintain the natural balance of the water cycle, the above discharge hierarchy⁴ must be observed. Where development results in changes in runoff destinations, the design must account for how the surface flows are managed and demonstrate it does not exacerbate off-site flood risk.

5.2.2 Infiltration structures (to ground) include soakaways, basins, swales and permeable paving. Infiltration rates for soakage structures are to be based on percolation tests undertaken in the winter period at the location and depth of the proposed structures. The percolation tests must be carried out in accordance with BRE DG 365, CIRIA R156 or a similar approved method, and cater for the design storm event between the invert of the lowest entry pipe into the infiltration structure and the base. Tests should be undertaken during winter / early spring when ground water levels are typically highest; if groundwater levels are influenced by the tide then tests should be undertaken over a high-water spring tide. For the purpose of design, the percolation rate must be applied to the sides of the infiltration structure only and the rate for the base must be zero. This

⁴ SuDS selection hierarchy based on: CIRIA C753 - The SuDS Manual; BS8582:2013 – Code of Practice for Surface Water Management for Development Sites; and Approved Document H of the Building Regulations.

does not apply to infiltration basins or permeable pavements, whereby the percolation rate is applied to the base only. The infiltration structure should drain 50% of its total volume in 24 hours or less for both the 1 in 10 and 1 in 100 year (plus climate change allowance) storm events, in order to provide spare capacity for subsequent storms. Flood risk assessments: climate change allowances can be viewed via the following link:

<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

- 5.2.3 Any infiltration drainage design must include adequate winter groundwater monitoring data in areas of known groundwater issues, to determine the highest winter groundwater table. Residential developments in excess of five properties will require ground water monitoring to be carried out between October and March inclusive. The extent of monitoring required for smaller developments will be subject to agreement with the District or Borough Council Engineers. Adequate freeboard must be provided between the base of the soakaway structure and the highest recorded groundwater level identified in that location; ideally this should be 1m.
- 5.2.4 Deep bore soakaways should only be considered after other forms of infiltration attenuation have been explored and in all cases, the applicant will be required to consult the EA hydrogeologist before their inclusion in a drainage strategy.
- 5.2.5 Infiltration is not always appropriate, and the advice of the drainage engineer should be sought for developments in or close to source protection zones (SPZs), in areas with a known history of land contamination, or in areas with known high seasonal groundwater levels.
- 5.2.6 Surface water must not be discharged into the foul sewer system. Discharge to a watercourse or surface water sewer must be restricted to the estimated mean greenfield runoff rate (Q1) by means of a controlled outflow (but see paragraph 5.4.4 regarding restrictions on runoff rates for brownfield sites). Flood Estimation Handbook (FEH) methods should be the preferred approach for developing runoff estimates used in surface water design⁵. There is also a tool available on www.ukSuDS.com that allows calculation of Q1 by both FEH and IH124. Both the point of connection and discharge rate must be agreed with the relevant owner or responsible body including internal drainage boards, highway authorities,

⁵ SuDS Manual paragraph 24.3.

sewerage undertakers, riparian owner, Environment Agency, Canals and River Trust and others (see also paragraph 4.3 Ordinary Watercourses).

SuDS Policy 2: Manage Flood Risk Through Design

- 1. The drainage scheme proposed is to:**
 - a. protect people and property on the development site from flooding; and,**
 - b. avoid creating any additional flood risk outside of the development in any part of the catchment, either upstream or downstream.**
- 2. Any drainage scheme must manage all sources of surface water, including exceedance flows and surface flows from offsite, provide for emergency ingress and egress and ensure adequate connectivity.**
- 3. For large sites where development is to be phased, there will need to be a strategic site surface water management system that allows different parts of the site to be developed at different times while ensuring that each of the design criteria can be met.**

5.3 SuDS Policy 2: Manage Flood Risk through Design

- 5.3.1 The natural drainage catchment for the site needs to be mapped including the water that drains down into / through the site from outside the site boundary. The pre and post development drainage is to be based upon the whole catchment demonstrating how off-site drainage is being managed within the proposed strategy.
- 5.3.2 The drainage system must be designed to operate without any flooding occurring during any rainfall event up to (and including) the critical 1 in 30 year storm (3.33% AEP). The system must also be able to accommodate the rainfall generated by events of varying durations and intensities up to (and including) the critical, climate change adjusted 1 in 100 year storm (1% AEP) without any on-site property flooding and without exacerbating the off-site flood-risk. Sufficient steps are to be taken to ensure that any surface flows between the 1 in 30 and 1 in 100 year events are retained on site. Storage should be based upon analyses of a range of winter and summer storm profiles to determine a critical storm event.
- 5.3.3 The choice of where these volumes are accommodated may be within the drainage system itself or within other areas designated within the site for conveyance and storage.